USENIX

The following paper was originally published in the
Digest of the Large Scale System Administration of Windows NT Workshop
Seattle, Washington, August 1997

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In Search of a Complete and Scalable Systems Administration Suite

August 1997

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1. Introduction

Any large IT site consists of many different components, each at various stages of evolution: old, current, next release. They have from the SA perspective, very little in common and their internal SA takes place in disjunct domains. The configuration files are not in a single repository and the native SA tools, if they exist, are different. Their coherency requires bespoke tools and procedures on top.

IT infrastructure components that require management are for example: Applications, clients and servers, NT, printers, printer network boxes, network kit, database systems, databases, asset databases, charge back systems, UNIXes, dedicated file servers, the various RAID solutions, tape robots, network backup tools, problem tracking systems, etc. This is a multidimensional problem space which has to be put and kept in sync.

Popular marketing information creates the belief that an all encompassing System Administration Tool that could reduce the cost of operating this all, does exist. Reducing the dependency on all the techies that create ever new points in the above defined space is also a desire that could be met.

Over the years a number of promising, and out-right recommended, tools were evaluated in SIEP, leading to many disappointments.

A summary of the findings, leading to way of assessing a suite's internal engines and coverage against a given site, is presented.

1.1 The SIEP site

Shell International Exploration and Production BV (SIEP) has in the past years developed an infrastructure consisting of about 1500 PC desktops, and 500+ UNIX systems. The company is spread over a number of geographically separate sites.

The majority of the PCs run Windows 3.11 in a Novell server environment, newer Win95 and WinNT systems are now being deployed in significant numbers. SIEP's current strategy for PC desktops is Windows NT 4.0 with a Shell harmonised suite of products and tools.

The UNIX systems have typically been used for running technical applications, but the nature of NT (and the ever increasing power of the systems on which NT runs) is necessitating a strong integration of the two environments.

Scaleability of System Administration issues have as yet not been well understood for NT.

We nevertheless need to provide a workable solution for all of these areas in the very near future.

1.2 Author's background

During my IT career I have been involved in the system administration of PDPs, VAXes, UNIXes, in small and simple, as well as large and heterogeneous sites. The implementation of a site-wide AFS service is one of my last projects. AFS provides a UNIX oriented file space to its clients that is secure, scaleable, has a uniform name-space and provides facilities for delegation of system administration of file system areas. The view and experiences with SA

suites presented is based on the work and dates back to the time when the evaluation was done. They are very much presented from a UNIX background.

2.0 The Suites

2.1 Tivoli

Tivoli implements a database for configuration information and a very attractive and well structured GUI to work with that. The fundamental attractiveness of Tivoli was that it uses some Object Oriented way of populating configuration settings down a hierarchy. This means that once site/cluster defaults are set, only object specific values need to be set, all other details are inherited.

2.1 Dec-Athena

Dec-Athena was Digital's commercial implementation of some of the UNIX system administration parts of the large Athena project carried out at MIT. During the Athena project many good fundamental ideas and approaches to system administration were formulated and many of them were actually implemented. Athena provides a nice icon based system administrators front-end, with which one manages the site configuration data stored in a SQL database.

2.2 HP-OpenView

In some environments HP-OV is associated with "everything that one could possibly mean by system administration". In fact HP-OV is an empty framework for hooking tools under. As yet we have not been able to identify a tool which we would want to hook into it to do system administration. Some network tools are very good, but there is little gain in the fact that they share the HP-OV framework with other tools. Icon level integration is very common.

Large parts of the HP-OV tools and components we looked at provided just templates and a framework for the passive parts of system administration.

As so often, so much needs to be done to augment it with own scripts and procedures to come to a critical mass that the question arises whether there is sufficient benefit in using the framework at all.

3. Fundamental issues with the suites.

Many of the SA suites share the same problems, the most annoying are summarised here:

- Very limited coverage of configuration files. Most only provide support for the most superficial configuration files (passwd, NFS, but not inetd AND /etc/services). Just support for one (i.e. NIS) facility to propagate some of its information. NIS is considered insecure, others were never adopted by the vendors in general.

- Iconised system management. This has some fundamental problems. Drag and drop provides little audit trail. It is not possible to prepare changes, and check them in advance. One needs build-in facilities for massive changes in batch mode. Drag and un-drop for un-doing things hasn't yet been very well accepted in the industry, recovering from mistakes is thus a problem. Anything that has to do with renaming/moving/undoing things is far less smooth than the glossy brochures makes one believe it is.

- Icons usage. Icons are used to give objects a place in one's world. Typically the strings that are beneath an icon occupy a little portion of its size. When managing hundred of the same things (hosts, printers, users, disks) one gets hundreds of the same icons, many of which are outside the viewable area of one's screen. Its then necessary to scan the screen with one's eyes to find a particular object in order to modify the setting for object "ufsgwy1". This is counter productive. Why use icons at all when one in reality uses strings and lists?

- Not enough support for diversity. Example: With DEC-Athena it was, for the OS serving part, necessary to install a server per OS, per OS-subrelease. SIEP has at any time about 25 (slightly) different OSes/platforms/subreleases in the air.

- Inward looking. Example: DEC-Athena was targeted at the administration of the 200+ client site. When one comes to that level of clients and thus could benefit from Athena, it is not possible to migrate clients and services smoothly, i.e. over time, into the Athena environment. The whole site has to be Athena-fied in one big bang!

- Version control. Example: To reduce the pain of managing and using diverse platforms, with their different user-interfaces/home environments/keyboard mappings, Athena provided its own user profiles and window manager. But it is difficult to see that the Athena developers can cope with the in-flux of new OS, shell, GUI releases and hardware of all the various vendors. Or that the vendors would always provide the right source code to the Athena developers in time, after all each vendor sells its own management suite. The same applies to system file and configuration propagation facilities.

- Little added value in key areas. Creating a NFS server in Athena terms is very simple, it takes about 10 seconds. Which is exactly what management wants to hear. But Athena doesn't take care of the basic HW installation, OS installation, formatting the disk, "newfs"ing the disks and planning the use of the space to be exported or the restructuring of that. So just 2% of the work involved in setting up a NFS server has been automated. Why then use a tool for this at all?

- Performance management facilities. Many SA suites promise "Performance Management". This is marketing. At best (interfaces to) a platform's monitoring tools are provided. None of the suites provide a tool that properly explains a measurable item, relates the measured value to the relative speed of, and general load on the host, interprets the measured data or gives advice for improvement. Even simple, normal performance management tasks, like moving active files to different places is not take care of. Some performance management tools pretend to track things for which the OS maintains no structure.

4. Positioning tools for a site.

Continuing to write, using and maintaining bespoke System Administration tools is commonly recognised as undesirable. This leads in some cases to the situation that is started on the implementation of a commercial suite in the hope that there "must" be some benefit to be gained. This is questionable. That a tool works is not enough.

When installing a SA tool, this just adds another, and non-productive, component to the set of components to manage. By nature it will have to be integrated with more than one other component in the environment. Which adds to the version control problem. Only when the SA tool's real coverage in the multidimensional space mentioned above outweighs its own SA effort can one hope to achieve cost savings or greater flexibility.

The developers of the SA tool of choice must have demonstrated to be capable and committed to stay ahead of the rest of the pack with respect to all versions of all hardware and components it supports. This sometimes includes totally new architectures for some kit between minor updates. Version control problems will otherwise lead to extra costs and delays or the hidden phasing-out of the tool, thereby worsening the situation.

4.1 Key requirements for the internal working of a suite.

The key requirement for a good scaleable SA tool is for a facility that would store, manage and distribute, on a sufficient large, complete and diverse scale, all configuration files. It should collect (and this even for "foreign" clients) and store client configuration data-sets, provide tools to tailor these and then for every configuration data-set, at boot/reset/refresh time:

1) obsolete the particular configuration data-set,

2) read a new data-set from a central repository,

3) use that, or if not available use the obsoleted data set from 1)

It should include logging and version control.

Other requirements are:

Icon, command- and script level interface.

Facilities for delegating System Administration in a number of areas/subgroups and in a few levels.

Sufficient coverage of OSes, patch levels, platforms, services, end-user applications, each in a number of release levels in parallel.

Positive co-existence/co-operation with existing kit to allow migration and use of not (yet) supported kit.

And it obviously has to be secure, scaleable, available.

4.2 Requirements for the coverage

System administration covers, next to the systems' configuration settings, subjects and topics like: file and name space management; backup/restore; common application start-up; installation, maintenance and upgrades of many often very different sub-components next to each other; security; system administration delegation; printing and plotting systems; charge back accounting; system monitoring; capacity planning and performance management; obsolescence of applications, systems and protocols; directed messaging to users; regular system maintenance vs. 24*7 services.

These need either to be covered by a SA tool, or it should co-exist and co-operate with other facilities in a positive way.

5. NT system administration concerns

The same concerns and issues mentioned above for the UNIX world apply to the NT world. But the lack of company wide familiarity with large scale NT system administration, the fact that NT's management is GUI based, often not complemented with a command line interface, and the fact that many NT applications have inherited the "single user PC" lack of notion of management, all lead to an even greater feeling of uneasiness here.

6. Conclusion

The IT market place is "Time-to-Market" driven. All pages in the trade press promise cost savings and increased efficiency by just hitting this button. A real large site system administration product that can be used by more then one type of customer site, requires it be too generic, too robust and too complex to fit in this market.

As yet there are no cross platform systems administration tools that cover a critical mass of items.

Readily available SA functions mostly focus on the work any junior assistant could do in a single workstation environment.

There are sites that have indeed installed a commercial SA suite but some of them, either don't really use it at any significant level, or hide the real integration, development and lock-in costs.